Spring 2022 EE214 Experiment 7
Active RC Filters

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Contents

1 Introduction

In this experiment, active RC low-pass and band-pass filter are will be studied. Their cut-off and center frequencies will be found manualy and using BenchVue test flow program and frequency and phase responses will be plotted. Afterwards, passband bandwith of band-pass filter will be measured and by making some adjustments to the band-pass filter circuit, its bandwith will be increased.

2 Experimental Results and Discussion

The results of the experiment are discussed in the following steps.

2.1 Step 1

In this part, circuit in figure 1 is set with an input sine wave of 1V peak. Then, max output voltage is found and recordeed as center frequency by manually changing the frequency.

Afterwards, half power frequency which is equal to 0.7 times of the center frequency is found by trying the frequencies and these values are recorded in table 1.

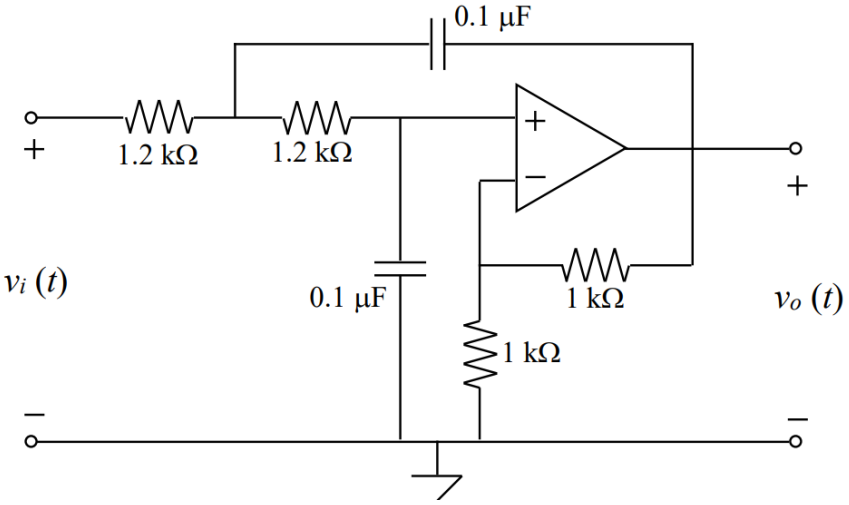

Figure 1: Circuit for step 1

Table 1: Measurements

w_c	$H(w_c)$	$\lvert H(w_c)\rvert$	$\lvert H(w_0)\rvert$	$H(w_0)$
a	a	a	a	a

Afterward, frequency and phase response of the cicuit are obtained using computer BenchVue test flow with DC sweep from $\frac{f_c}{5}$ to $5f_c$ with the steps $\frac{f_c}{10}$.

After making necessary test flow settings and run the test, magnitude and frequency responses of the circuit are obtained. Then, datas are exported to MATLAB and w_0 ,w_1, and w_2 are determined from magnitude response plot and showed as in Figure 2.

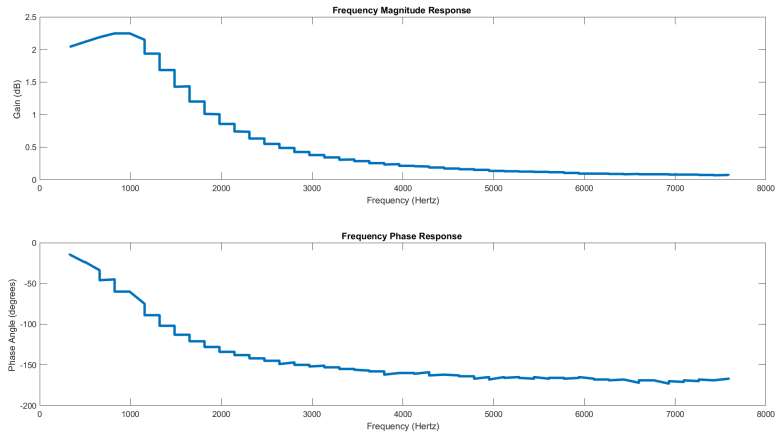

Figure 2: Magnitude and Phase response of circuit 1

2.2 Step 2

In this step the circuit given in Figure 3 is constructed.

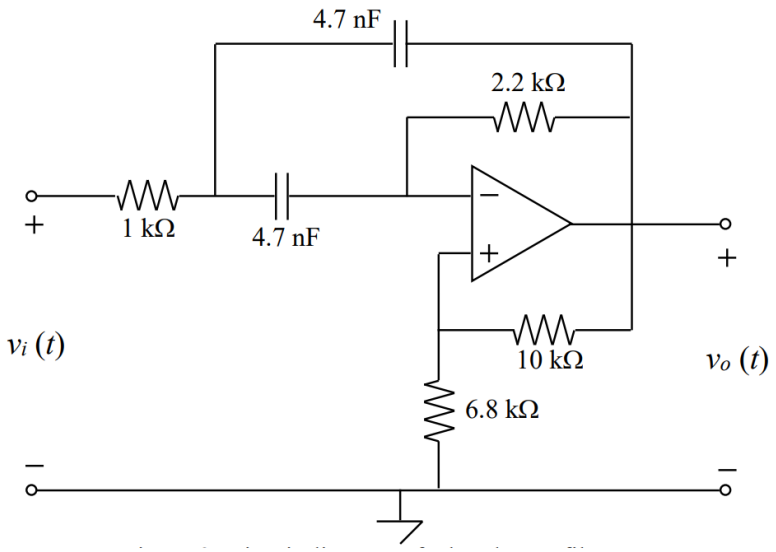

Figure 3: Circuit for step 2

2.2.1 a)

The frequency magnitude and frequency phase response of the circuit is obtained and given in Figure 4.

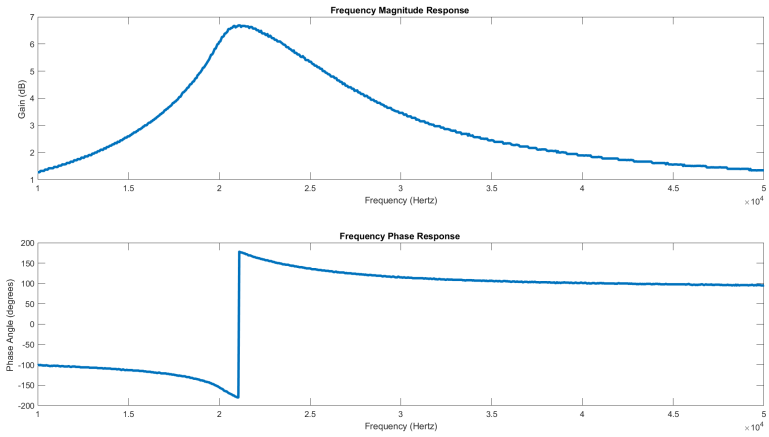

Figure 4: Magnitude and Phase response of circuit 2

2.2.2 b)

The resistors on the positive feedback side , a.k.a. the resistors of 6.8k and 10k are disconnected and the V+ is terminal is grounded. As a result the frequency magnitude and frequency phase responses are obtained and shown in Figure 5.

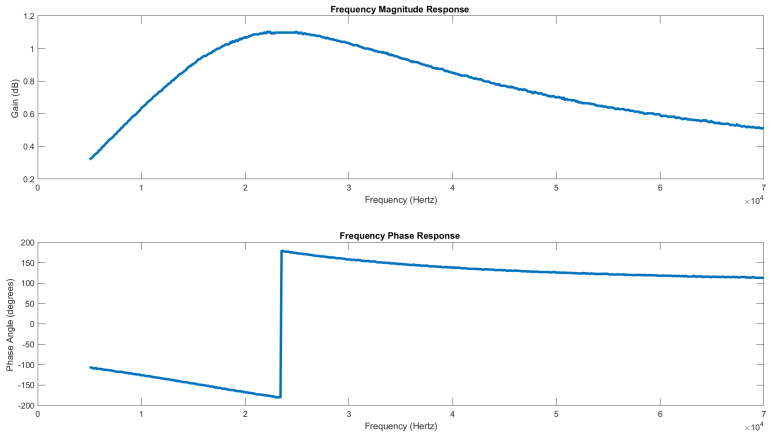

Figure 5: Magnitude and Phase response of circuit 2 without the resistors

3 Conclusion

In this experiment, active RC low-pass and band-pass filter are studied. Their cut-off and center frequencies are found manualy and using BenchVue test flow program and frequency and phase responses are plotted. Afterwards, passband bandwith of band-pass filter are measured and by making some adjustments to the band-pass filter circuit, its bandwith is increased.

Appendix A

- PreLab Preparation 2 hours
- Experimental Work 2 hours
- Report Writing 9 hours